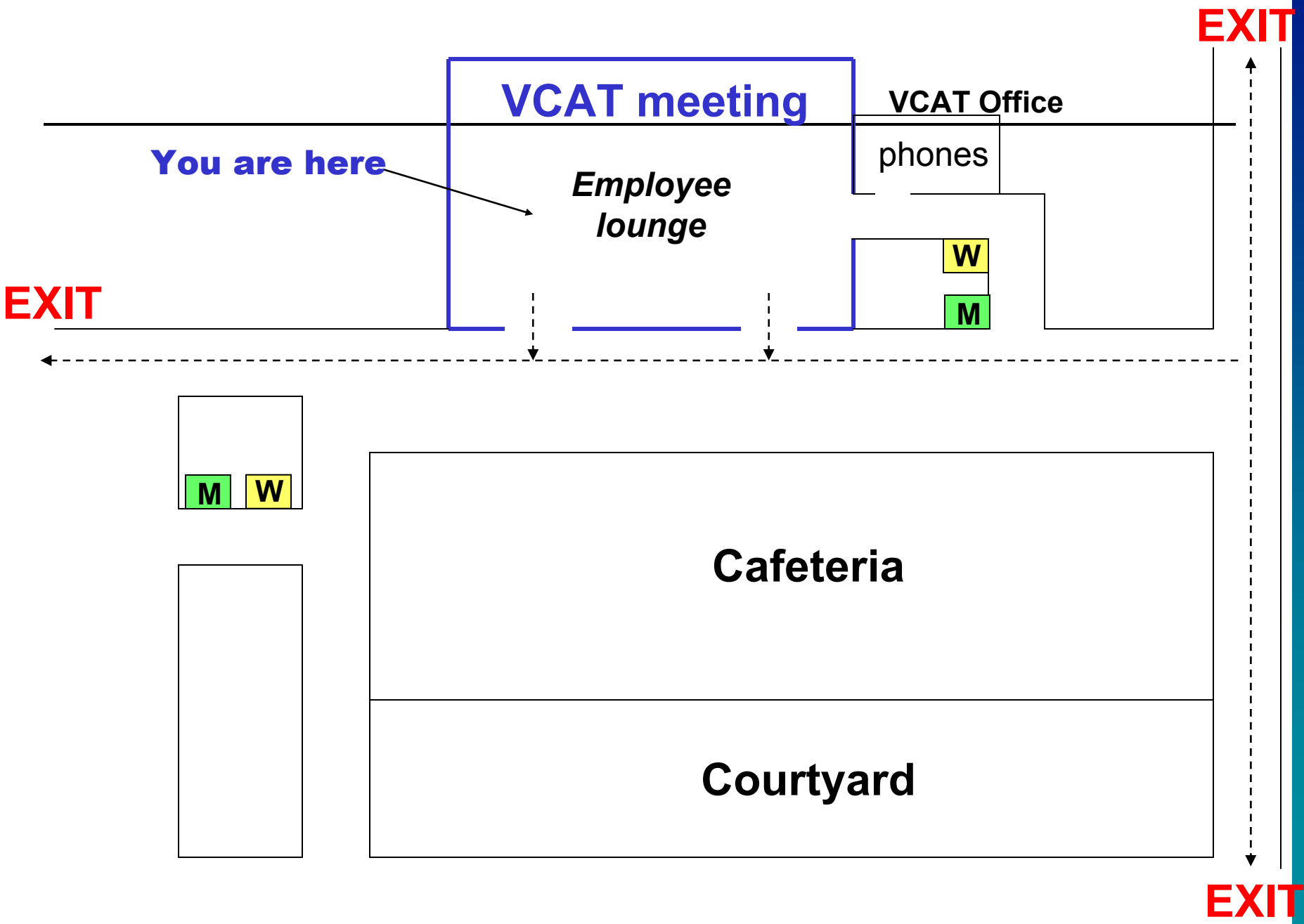

EXIT
VCAT meeting
VCAT Office
phones
You are here
Employee lounge
W
M
EXIT
M
W
Cafeteria
Courtyard
EXIT

# NIST Update

**William Jeffrey**
**Director**

Visiting Committee on Advanced Technology
March 7, 2006

NIST
National Institute of Standards and Technology
Technology Administration
U.S. Department of Commerce

# Outline of VCAT Agenda
# March 7-8, 2006

- **NIST Update**
- **NIST Strategic Planning and Priority-Setting Process**
  - Manufacturing Engineering Laboratory
  - Building and Fire Research Laboratory
  - Chemical Science and Technology Laboratory
- **Ethics Training for VCAT Members**
- **Laboratory Tours**
  - Supply Chain Interoperability
  - Metrology for Quantitative Cell Biology
- **Summary of NRC's FY04-05 Assessment of NIST Labs**
- **Economic Analysis at NIST**
- **Wrap-up**

# NIST Update

- New VCAT Members
- Staff Changes & Recognition
- Technical Highlights
- FY07 Budget

# New VCAT Members

**THOMAS M. BAER**

Consulting Professor
Department of Applied Physics
Stanford University

Co-founder of Arcturus Bioscience, Inc

**PAUL A. FLEURY**

Dean of Engineering and Frederick W. Beinecke
Professor of Engineering and of Applied Physics
Yale University

# NIST Outreach…

- DoC Secretary Gutierrez and Dr. John Marburger, Science Advisor to the President, visit NIST.
- Visits conducted or scheduled with USAF Chief Scientist; ADNI S&T; DHS DNDO; etc…
- Over 25 Congressional Staffers have visited NIST within the last 2 months.
- Homeland Security Dialogue Forum
- Outreach to CEOs plus senior technical officials from numerous companies and industry groups
- Cited in The Wall Street Journal

# NIST Staff Changes

**Belinda Collins**, Director of Technology Services

**Kevin Kimball**, Acting Director of Congressional and Legislative Affairs

**Susannah Schiller**, Acting Chief Information Officer

# Staff Recognition

## William J. Boettinger

National Academy of Engineering (NAE)

**Improving the design and processing of materials, from aerospace alloys to lead-free solders for micromaterials.**

## Katharine Gebbie

Government Women's Visionary Leadership Award

**For her inspired sustained extraordinary leadership and dedication in creating the Nation's foremost research laboratory with expertise in precision metrology and physical science.**

# Staff Recognition

## Rodney A. Bryant

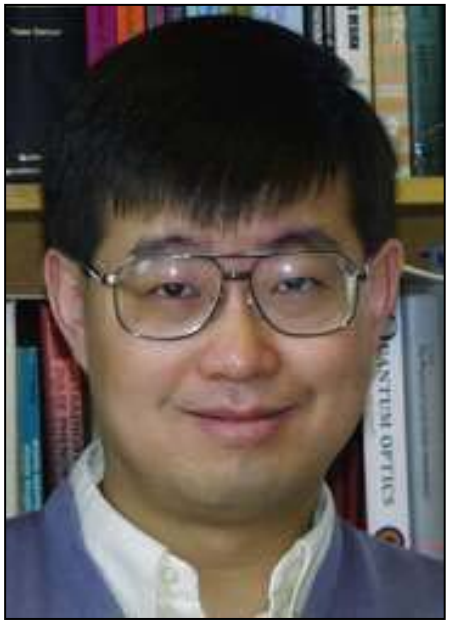
2006 Black Engineers of the Year
Outstanding Technical Contribution in Government

**Advancing the understanding of fires through the development of 3-D modeling techniques and full-scale fire tests.**

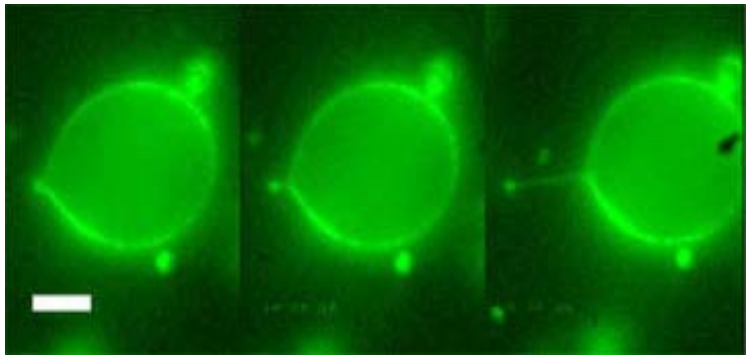
## Jun Ye

2006 Optical Society of America
William F. Meggers Award

**Development of innovative spectroscopic techniques based on femtosecond optical frequency combs.**

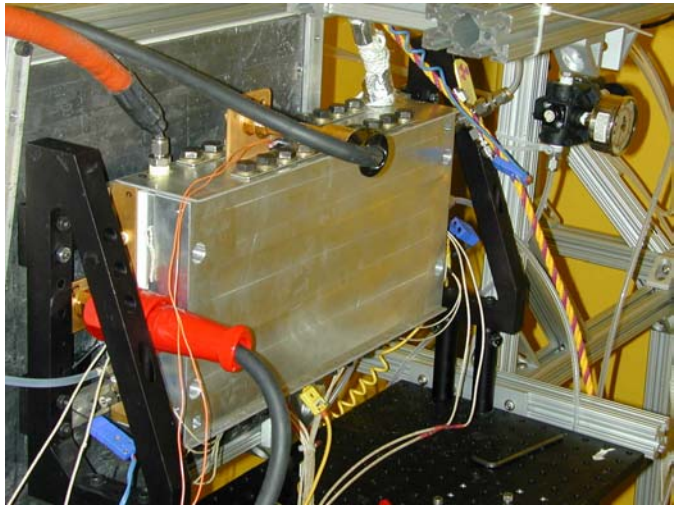


# Technical Highlights



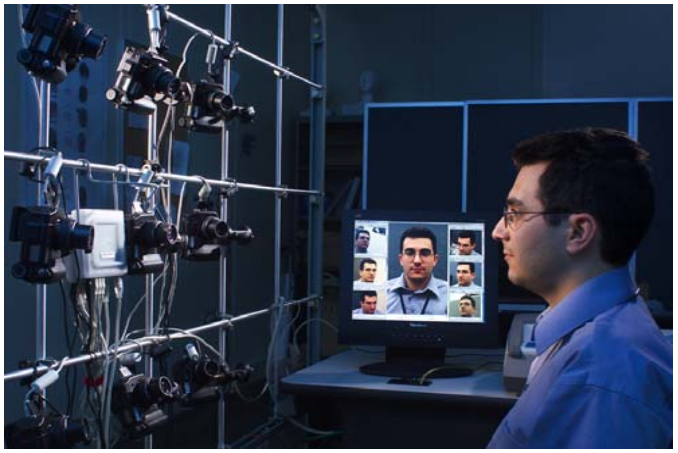
- ***Polymer Nanotubes***: unusually long, stable and hold shape indefinitely.
- Nanotubes made from other materials are typically fragile and usually collapse within hours.
- Sturdy nanotubes prevent collapse, making them suitable for a wide range of commercial applications.

- NCNR's neutron imaging facility contains upgraded fuel cell and imaging systems.
- Only facility in the world that can handle full-scale fuel cells.
- First experiments are on-going with visiting scientists from General Motors.



# Technical Highlights

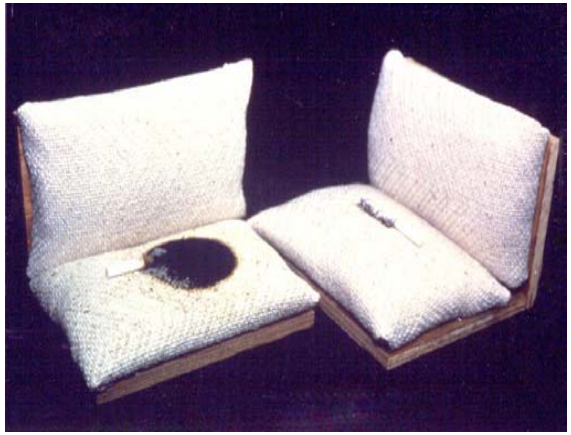
- AML Nanofab has been completed and is open for NIST staff and associates.
- Provides researchers at NIST with the ability to fabricate prototypical devices, test structures, measurement instruments, and reference materials down to the nanoscale.



- Final publication describing how biometrics should be stored on Personal Identity Verification (PIV) cards was issued.
- PIV cards will be required for all federal employees and contractors beginning in October 2006.

# Technical Highlights

- Cigarettes are the largest igniters of fatal fires in the US, causing 700-800 deaths, 1,700 serious injuries and $400 million in direct property damage.
- Several states now require compliance with a standard that requires that no more than 25% of the 40 tested cigarettes burn their full length.
- SRM is used to calibrate measurement techniques, assuring accurate measurements of commercial cigarettes.




- A new CPSC flammability standard calls for slower burn rates for mattresses and mattress foundation sets.
- NIST developed test methods to quantify the mattress burn rate.
- Slower burn rates are expected to save 270 lives and prevent 1,330 injuries annually.

# Technical Highlights


- The US Election Assistance Commission formally adopted the voluntary voting system guidelines.
- Initial recommendations were completed by the TGDC in May 2005.
- Most recommendations adopted by EAC.
- TGDC is chaired by the NIST Director.

# The President's FY 2007 Budget Request for the National Institute of Standards and Technology…

**Part of the President's**

**American Competitiveness Initiative**

# President's State of the Union Address

* White House Photo by Shealah Craighead

**NIST's Debbie Jin in special guest section of the Gallery during the President's State of the Union Address**

# President's 10-Year American Competitiveness Initiative

- Announced in the State of the Union address
- Doubles, over 10 years, investment in:
  - NIST core (laboratory and infrastructure)
  - National Science Foundation
  - DOE Office of Science
- Commits $50 billion of new funding to these key agencies
- Makes permanent and updates the R&D Tax Credit
- Increases math and science education (K-12) and increases the number of math and science teachers
- Increases worker training and retraining opportunities
- Reforms immigration policies to attract and retain the best and brightest from around the world

# NIST FY 2007 President's Budget Request
## (in millions of dollars)

| | FY 2005 Enacted | FY 2006 Enacted | FY 2007 Request |
|---|---|---|---|
| **STRS** (w/o directed grants) | **$370.0** | **$382.9** | **$467.0** |
| Labs | 364.6 | 375.6 | 459.4 |
| Baldrige | 5.4 | 7.3 | 7.6 |
| **CRF** (w/o directed grants) | **29.6** | **48.3** | **68.0** |
| **TOTAL** (STRS + CRF) | **$399.6** | **$431.2** | **$535.0** |
| | | **+$104M (+24%)** | |
| **ITS** | **$247.9** (MEP+ATP) | **$183.6** (MEP+ATP) | **$46.3** (MEP) |
| **Directed Grants** | **$51.7** | **$137.3** | **N/A** |

# R&D Initiatives: Examples of Requirements Flowdown

| R&D Priority | NIST Response |
|---|---|
| Scaled-up, reliable, cost-effective nanomanufacturing (OMB/OSTP R&D priority memo and NNI Strategic Plan) | Nano Discovery to Manufacture |
| Enhanced industrial competitiveness by integrating global supply chains (based on economic impact studies) | Manufacturing Innovation through Supply Chain Integration |
| Insufficient capacity in neutron research facilities (detail in NSTC report and in OMB/OSTP R&D priority memo) | NCNR Capacity and Capability |
| Hydrogen storage, production, and fuel cell technical hurdles (OMB/OSTP R&D priority memo and NSTC Manufacturing R&D IWG) | Enabling the Hydrogen Economy |
| Pursuing novel atomic and molecular-level systems where coherent control holds great potential (OMB/OSTP R&D priority memo) | Quantum Information Science – Infrastructure for 21st Century |
| Convert qualitative medical imagery into quantitative data that can detect problems earlier leading to more effective treatments and lower medical costs (based on industry and NIH stated needs) | Bioimaging: A 21st Century Toolbox for Medical Technology |

# NIST Increase in the FY 2007 President's Budget Request

***Targeting the most strategic and rapidly developing technologies (+$45 million)***

- Nano Discovery to Manufacture
- Enabling the Hydrogen Economy
- Quantum Information Science – Infrastructure for 21st Century
- Innovations in Measurement Science
- Cybersecurity: Innovative Technologies for National Security

***Increasing the capacity and capability of critical national assets (+$27 million)***

- NIST Center for Neutron Research (NCNR) Capacity and Capability
- Synchrotron Measurement Science and Technology

***Meeting the Nation's most immediate needs (+$12 million)***

- Manufacturing Innovation through Supply Chain Integration
- Structural Safety in Hurricanes, Fires, and Earthquakes
- International Standards and Innovation: Opening Markets
- Bioimaging: A 21st Century Toolbox for Medical Technology
- Biometrics: Identifying Friend or Foe

***NIST facilities improvement plan (+$20.1 million)***

- Design and renovation of 2 buildings in Boulder, CO
- Safety, Capacity, Maintenance and Major Repairs
- NCNR initiative mentioned earlier includes construction funds

# Enabling Nanotechnology from Discovery to Manufacture
(+$20 million)

- **Nanotech market predicted to exceed $1 trillion by 2015**
- **NIST brings:**
  - multidisciplinary measurement expertise
  - world-class Advanced Measurement Lab
  - national user facility experience

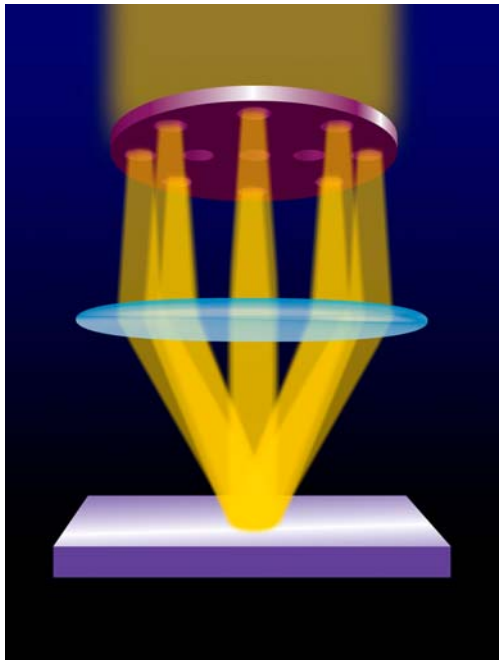


Illustration by Beamie Young

- **Expand the Center for Nanoscale Science and Technology (CNST)**
  - work with industry, universities, and other agencies to bridge the gap between science and production
- **Expand NIST research efforts to support industry through nanoscale measurement science and standards**

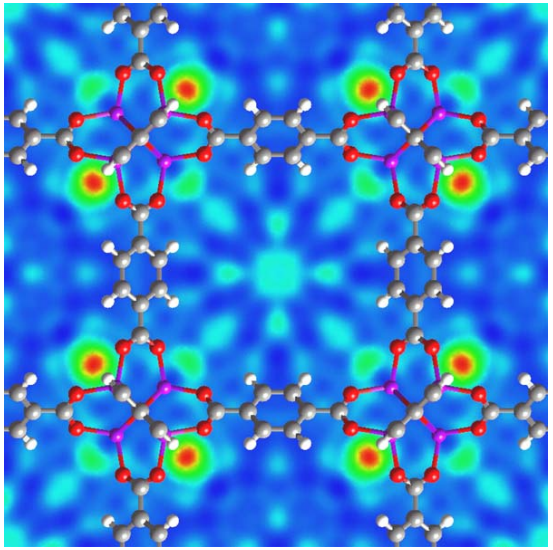
# NIST Center for Neutron Research Expansion and Reliability Improvements (+$22 million, STRS+CRF)

- **U.S. neutron facilities can't meet current demand**
- **Neutrons offer unique benefits**
  - protein structure/function
  - trace chemical analysis

photo © Robert Rathe

- **NIST Center for Neutron Research (NCNR)**
  - nation's leading neutron facility
  - serves more users than all other U.S. neutron facilities combined
- **Upgrade NCNR – 5-year plan**
  - Add additional cold source and new guide hall
  - provide new generation of world-class instruments
  - serve 500 more researchers each year

# Enabling the Hydrogen Economy
## (+$10 million)



- **Hydrogen fuels benefits**
  - reduced dependence on foreign energy sources
  - lower environmental impact
- **NIST brings:**
  - 50 years of technical expertise
  - Congressional mandates for weights and measures, pipeline safety
- **NIST will:**
  - improve efficiency, durability, manufacture of hydrogen fuel cells
  - develop standards for pipeline safety and reliability
  - develop standards, calibrations for equitable trade of hydrogen

# Manufacturing Innovation Through Supply Chain Integration (+$2 million)

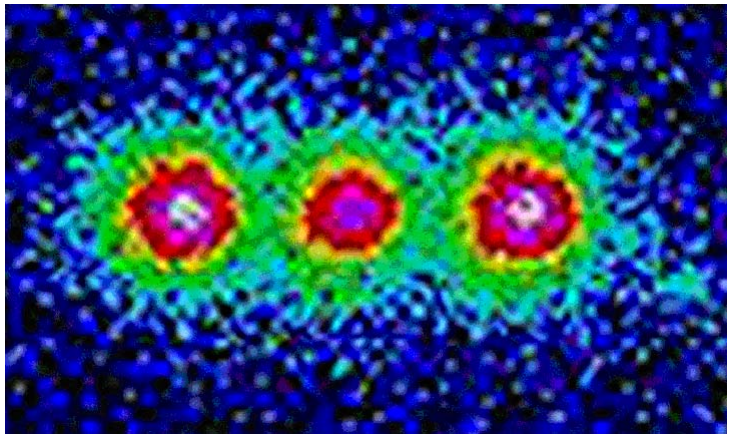
- **Inefficient exchange of product designs and data**
  - costs U.S. economy > $25 billion/year
- **Opportunity mirrors NIST strengths**
  - standards, measurements, testing tools, neutral convener

photo courtesy Corbis

- **Will foster seamless global supply chain for the auto, aerospace, and construction industries**
  - create “roadmaps” for developing open standards for enterprise integration
  - develop and test standards, ensuring consistency with international standards

# Quantum Information Science – Infrastructure for 21st-Century Innovation (+$9 million)

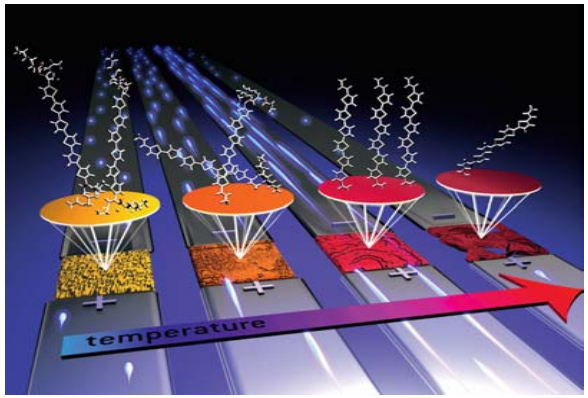
- **Revolutionary potential, ultrapowerful computers, "unbreakable" code to protect financial transactions**
- **NIST is a world leader in the field**
  - world-renowned scientists, including three Nobel laureates
- **NIST will**
  - expand research on quantum information
  - develop new measurement tools and methods
  - support a Joint Quantum Institute with a university and the National Security Agency



# Structural Safety in Hurricanes, Fires, and Earthquakes (+$2 million)

- **$52 billion annually in property damage, disruption of commerce, lost lives**
- **Goal is to save lives, reduce damage to structures**
- **Proposed program will advance:**
  - extreme wind database and other tools
  - fire and smoke wildland prediction methods
  - earthquake-resistant design and construction methods
  - better prediction of structural capacity

# Synchrotron Measurement Science and Technology (+$5 million)




- **Synchrotrons complement neutron sources—**
  - imaging & analysis of chemical, electronic & structural properties used in developing new, innovative materials
- **National Synchrotron Light Source at Brookhaven National Lab**
  - will upgrade three beamlines and establish two new beamlines
- **Will be used by 200 researchers a year**
  - any material, made of any elements, subnanometer resolution

# International Standards and Innovations
(+$2 million)

- **Standards-related barriers to trade constrain innovation, entrench inferior technologies, raise transaction costs, and hinder interoperability**
- **NIST works to open markets for American workers and exporters**
- **NIST will**
  - provide technical leadership to ensure standards are not a barrier to U.S. exports
  - provide information and effective U.S. coordination with international standards organizations

photo courtesy Corbis

# **Innovation in Measurement Science** (+$4 million)

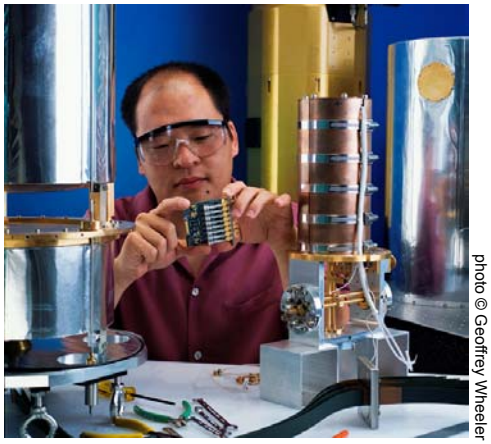


photo © Geoffrey Wheeler

- **Innovation incubator**
- **Supports high-risk, leading-edge NIST research that anticipates industry's needs**
- **Launched NIST expertise in quantum information science, fuel cell science, three-dimensional chemical imaging, for example**
  - All three NIST Nobel laureates had research funded by this program
- **Competitive program to fund multidisciplinary work with greatest potential for fostering innovation**

# Bioimaging: A 21st Century Toolbox for Medical Technology (+$4 million)

- **Vision—to convert pictures into reliable data for diagnosis and analysis**
- **Measurements foundation is lacking—assessments must be accurate, reliable, repeatable**
- **NIST will partner with NIH, bioimaging industry to improve**
  - molecular imaging for understanding bio processes
  - assessment of advanced biomaterials' behavior *in the body*
  - methods and technologies for bioinformatics

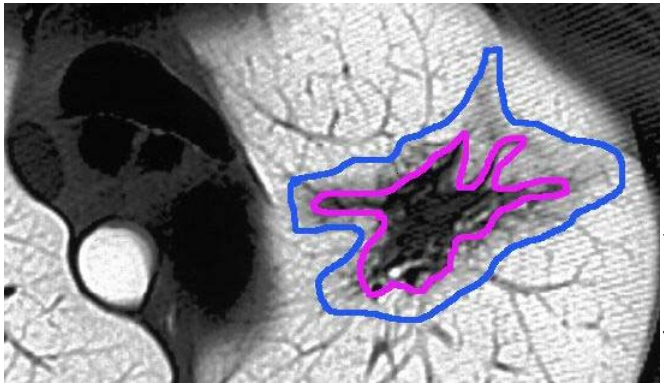


photo courtesy NIH

# Cyber Security: Innovative Technologies for National Security (+$2 million)

- **Critical to nation's productivity and infrastructure (transportation, financial systems, power grids, etc.)**
- **NIST has recognized technical expertise and statutory assignments**
  - encryption standards work estimated to have saved industry $1 billion

photo courtesy Corbis

- **Will develop measurement science and technologies**
  - identify and address vulnerabilities in real time
  - assess effectiveness of cyber security controls
  - mitigate attacks

# Biometrics: Identifying Friend or Foe (+$2 million)

- **Automated tools needed to identify people**
  - protect borders while allowing efficient travel
- **NIST has decades of experience**
  - now managing Face Recognition Grand Challenge Program
- **Funding allows**
  - testing of multimodal systems (2 or more biometrics)
  - image quality standards and tests
  - guidelines for system interoperability

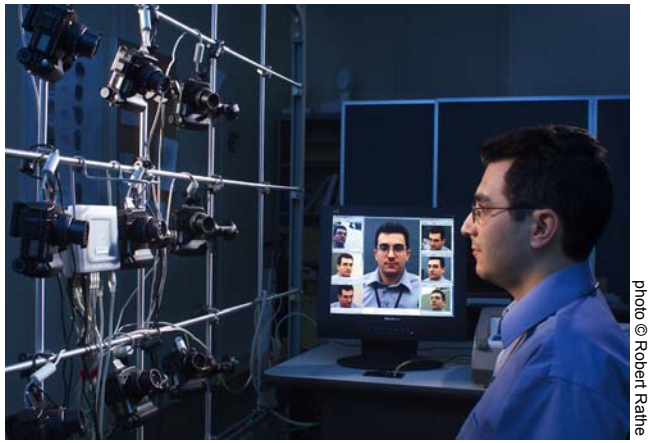


photo © Robert Rathe

# NIST Facilities Improvement Plan
# Construction of Research Facilities (CRF)

- Design/some renovation of two buildings in Boulder, Colo. ($10.1 million)
- Safety, Capacity, Maintenance, and Major Repair (+$10 million)
- NCNR initiative also includes $12 million for construction-related expenses.

President Eisenhower dedicates NIST's Boulder campus in 1954

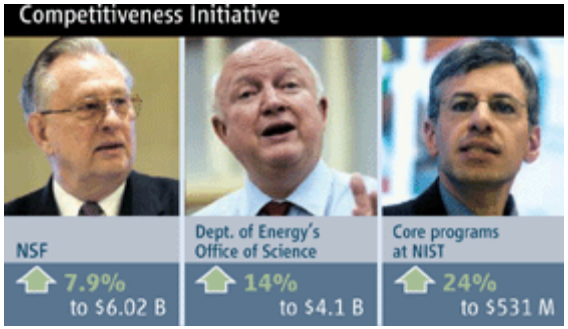
# FY07 Budget Rollout

- Industry-Association FY2007 Budget Briefing
- Business Software Alliance CEOs
- Congressional Committee Staff
  - Senate Committee on Commerce, Science, and Transportation
  - House Appropriations Subcommittee on Science, State, Justice and Commerce and Related Agencies
  - Senate Appropriations Subcommittee on Commerce, Justice, and Science
  - House Committee on Science, Representative Mark Udall (D-CO) and Representative Chris Van Hollen (D-MD)

# Growing Support for ACI and NIST…

Science

February 17, 2006




***"Despite an overall budget for 2007 that would reduce domestic discretionary spending, Wolf, who chairs the spending panel with jurisdiction over NSF and NIST, flat-out promises that both agencies "will get their number." (NSF is pegged for a 7.9 percent boost, and NIST's core programs would rise by 24 percent…"***

# Summary

- **The President's budget for NIST is extraordinary**
  - Indicates the importance and relevance of NIST's work to the nation
  - Particularly impressive given that the non-defense, non-homeland security discretionary budget is being decreased
- **Funding still needs to be appropriated by Congress**
- **We need to continue our strategic planning efforts so as to ensure that all our programs remain focused on the Nation's highest priorities and are consistent with NIST's mission**